

# Laparoscopic Toupet fundoplication with duodenojejunostomy for the management of superior mesenteric artery syndrome with reflux symptoms

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## Abstract

**Rationale:** The patient had symptoms of GERD and the reflux even caused the symptom of cough. Gaining weight is a risk factor for the treatment of reflux as it could exacerbated symptoms of reflux and the drug treatment is not effective. Surgical intervention becomes necessary when there is failure following conservative medical therapy or the patient.

**Patient concerns:** The patient was not satisfied with the drug treatment.

**Diagnoses:** Superior mesenteric artery syndrome, gastroesophageal reflux disease.

**Interventions:** Laparoscopic Toupet fundoplication with duodenojejunostomy.

**Outcomes:** The patient discharged from hospital 10 days after surgery without any postoperative complication. The patient achieved complete relief of symptoms and discontinuation of drug.

**Lessons subsections:** Superior mesenteric artery (SMA) syndrome may manifest the symptoms of GERD such as heartburn, acid reflux and cough. It is necessary to complete examination to exclude superior mesenteric artery syndrome for these patients. Laparoscopic fundoplication with duodenojejunostomy provided an effective treatment for patients who failed drug treatment.

**Abbreviations:** GERD = gastroesophageal reflux disease, PPI = proton pump inhibitor, SMA = superior mesenteric artery.

**Keywords:** case report, duodenojejunostomy, gastroesophageal reflux symptoms, superior mesenteric artery syndrome

## 1. Introduction

Superior mesenteric artery (SMA) syndrome is an upper intestinal (the third part of duodenum) obstruction caused by SMA compression. The main symptoms of the disease are postprandial discomfort, abdominal pain, early satiety, and so on. The patient presented in our report suffered from heartburn, cough, and vomiting and was diagnosed as having gastroesophageal reflux disease (GERD) in a local hospital. The patient insisted on surgical treatment because the disease had a severe impact on his quality of life and it was difficult for him to control symptoms after regular medicine including proton pump inhibitor (PPI) and gastrointestinal prokinetic drug.

The patient had both the typical symptoms and the extrasophageal symptoms of GERD, was diagnosed as having

SMA syndrome, and failed drug treatment. We performed laparoscopic Toupet fundoplication and hiatal hernia repair with duodenojejunostomy for the management of SMA syndrome with reflux symptoms.

## 2. Case report

### 2.1. Presentation

A 57-year-old male had a 3-year history of heartburn and a 1-year history of cough. The patient began to suffer heartburn, regurgitation, nausea, bloating, and vomiting 3 years ago. Acid could reflux to his mouth sometimes. He had to pad the head in order to reduce the incidence of reflux while sleeping. The patient began to cough while symptoms of regurgitation and heartburn aggravated 1 year ago.

### 2.2. Endoscopy result

The endoscopy result was esophagitis LA-C and atrophic gastritis with erosion. The patient was diagnosed as having GERD in a local hospital and received treatment of life adjustment and medicine including PPI and gastrointestinal prokinetic drug. The symptoms of cough, heartburn, and vomiting were relieved after taking drugs such as PPI in the beginning. However, the patient felt that symptoms were aggravated in the past 2 months and reoccurred after he stopping using drugs. He had a 5-kg weight loss during a period of 2 years. The body mass index of the patient was calculated to be 19.3 after hospital admission in our center. Physical examination revealed only abdominal slight tenderness.

### 2.3. 24-Hour pH result

The DeMeester score was 1.56 and the result did not meet the standard of acid reflux disease.

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#### 2.4. High-resolution manometry result

The lower esophageal sphincter pressure was lower than normal, all swallowing is invalid peristalsis.

Because the patient's 24-hour pH monitoring did not meet the standard of acid reflux disease, the patient completed upper gastrointestinal radiography to exclude other causes.

#### 2.5. Upper gastrointestinal radiography

The results of the upper gastrointestinal radiography revealed esophageal reflux disease and possible gastritis; hence, SMA oppression syndrome (descending part of duodenal dilation, the contrast agent blocked through the tract, formation characteristic of penholder oppression) was considered (Fig. 1). Abdominal CT scan revealed a 25° angle between the SMA and the aorta, a distance of 7.8 mm.

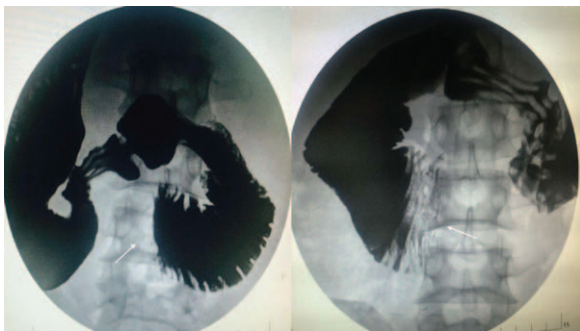
The patient was diagnosed as having SMA syndrome. We combined laparoscopic Toupet fundoplication with duodenojejunostomy to manage SMA syndrome complicating extraesophageal symptoms.

### 3. Methods

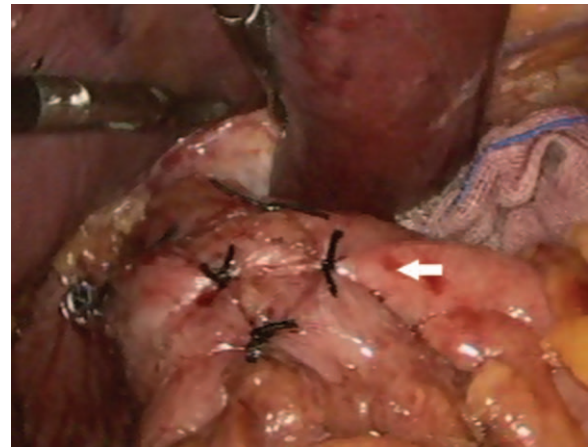
The patient gave consent to publish this case report and confirmed its content.

#### 3.1. Surgical procedure

Five incisions were made to insert trocar under general anesthesia. After the hepatogastric ligament was dissected with an ultrasonic scalpel, we saw a small part of gastric fundus and omental enter into the chest. We held hernia sac back into the abdominal cavity. Then we separated the right diaphragmatic peritoneum and the esophagus peritoneal to expose the abdominal segment of the esophagus at least 3 cm. In the left diaphragmatic crura, an increased diaphragmatic hiatus, approximately 3 × 4 cm, was found. A window was created below the lower esophagus. On the one hand, the gastric fundus was dissected by dividing short gastric vessels; on the other hand, the mediastinal structures, including pleura, pericardium, vagus nerves, and aorta, were identified and preserved. The diaphragmatic crura were sewed behind the esophagus with 2 nonabsorbable sutures. Then a posterior 270° two-centimeter-long fundoplication was constructed with 3 interrupted nonabsorbable stitches (Fig. 2). Finding the duodenum suspensory ligament in the left of transverse mesocolon mesentery, the



**Figure 1.** Upper gastrointestinal series shows an abrupt cutoff of the third portion of the duodenum (white arrow) and dilations of the first and second portions of the duodenum.



**Figure 2.** Intraoperative picture of Toupet fundoplication and the fold valve (white arrow).

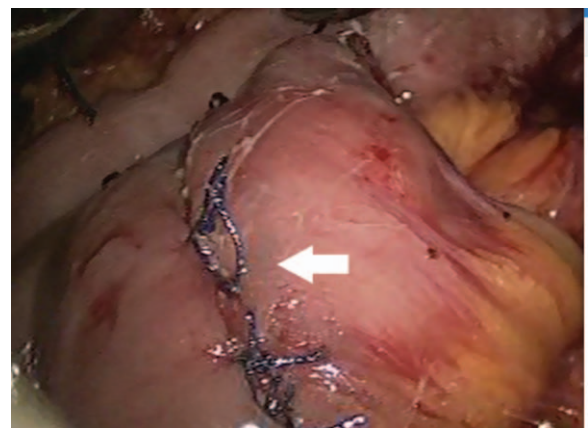
duodenum dilated obviously and was oppressed by SMA. Approximately 25 cm apart from the duodenum suspensory ligament, the proximal jejunum and duodenum level department were fixed with 2-0 nonabsorbable sutures. Two windows, approximately 1 cm, were opened in jejunum and duodenum with an ultrasonic scalpel before the gastrointestinal anastomosis stapler was inserted and plugged in. Then the anastomotic gap was closed and reinforced with stitches to finish the side-to-side anastomosis. The anastomotic gap was approximately 4 cm in diameter (Fig. 3).

#### 3.2. Result

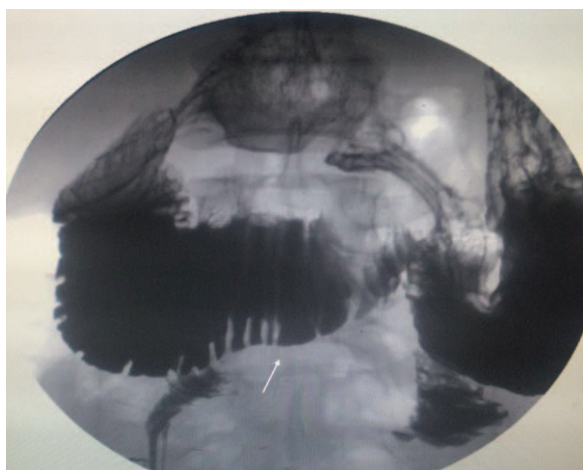
The operation lasted approximately 4 hours. The patient was discharged from the hospital on the 10th day after operation without any complication. Upper gastrointestinal radiography after operation shows barium passing through the third portion of the duodenum (Fig. 4). The patient achieved complete relief of symptoms and discontinuation of drug 1 year after operation.

### 4. Discussion

The SMA syndrome is a rare condition and the prevalence is estimated to be 0.013% to 0.3% in the general population.<sup>[1]</sup> Its



**Figure 3.** Intraoperative picture of duodenojejunostomy and the anastomosis (white arrow).



**Figure 4.** Upper gastrointestinal series shows barium passing through the third portion of the duodenum (white arrow).

manifestation is complex, including postprandial epigastric pain, nausea, vomiting, anorexia, and weight loss. The most typical and frequent clinical finding is intermittent or postprandial abdominal pain (59–81%).<sup>[12]</sup> However, a few patients manifest symptoms such as heartburn, cough, and vomiting because the obstruction of the duodenum could lead to the reflux of the gastric content. The SMA syndrome could be the etiology of GERD whose prevalence is as high as 2.5% to 7.8% in East Asia.<sup>[13]</sup> So it is critical to make sure of the diagnosis, especially for the patient with a negative result in 24-hour pH monitoring.

Angiographic, ultrasonic, and CT have been widely used for the diagnosis of the SMA syndrome.<sup>[14]</sup> Ultrasonic is considered as a rapid, repeatable, noninvasive, and low-cost way to perform a diagnostic procedure and is useful in screening of patients who have showed some clinical symptoms.<sup>[15]</sup> Angiographic, barium meal, and CT scan show dilatation of the proximal duodenum and the abrupt cutoff part of the obstructed tract, together with a decreased aortomesenteric distance as well as aortomesenteric angle.<sup>[16]</sup> Aortomesenteric angles  $<22^\circ$  to  $25^\circ$  and distances  $<8$  mm have correlated well with the diagnosis of SMA syndrome.<sup>[17]</sup> One study shows that the aortomesenteric distance may reduce to 2 to 8 mm.<sup>[18]</sup> Although the diagnosis of SMA is controversial, upper gastrointestinal series using contrast has been used as a standard in diagnosis of SMA syndrome for decades. In our report, CT scan and upper gastrointestinal radiography were used to make a definite diagnosis.

Marked weight loss and corrective spinal surgery are thought of as predisposing factors as they affect the fat that acts as a cushion between the aorta and the mesenteric artery. So conservative treatment such as gaining weight was used to increase vascular space between the SMA and the aorta to relieve obstruction in one study.<sup>[9]</sup> Total parenteral nutrition is used for patients who cannot tolerate oral feeds and has proved to be an effective treatment.<sup>[10]</sup> The patient had typical symptoms of GERD such as heartburn and regurgitation, and extraesophageal symptoms such as cough. Gaining weight for the treatment of reflux might exacerbate symptoms of reflux, and thus was a risk factor. This formed a vicious cycle for the treatment of the patient to some extent. Surgical intervention becomes necessary when there is failure after conservative medical therapy.<sup>[11]</sup> In addition, the patient was diagnosed as having esophagitis LA-C and had extraesophageal symptoms at the same time. So we decided to

treat the patient with laparoscopic duodenojejunostomy, which has been considered as an alternate choice as it offers a high likelihood of excellent outcome.<sup>[12,13]</sup>

We performed fundus fundoplication and esophageal hiatal hernia repair because the patient was diagnosed as having esophagitis LA-C and had extraesophageal symptoms. Considering the patient has a poor esophageal motility, we chose laparoscopic Toupet fundoplication that is thought to have a lower risk of postoperative dysphagia compared with laparoscopic Nissen fundoplication.<sup>[14]</sup> And laparoscopic Toupet fundoplication has been proven to be effective in treating patients with extraesophageal symptoms such as cough.<sup>[15]</sup>

We once performed only laparoscopic Nissen fundoplication for a patient in our hospital who had a similar condition; however, the symptom of abdominal pain was not relieved. Another patient receiving amputation of the ligament of Treitz and duodenal construction still needed to take medicine approximately 1 year after operation. This is also the reason that we combine laparoscopic fundoplication with duodenojejunostomy to solve the problem.

## 5. Conclusion

SMA syndrome could manifest as extraesophageal symptoms such as cough. Laparoscopic fundoplication with duodenojejunostomy is an effective treatment for patients with such conditions.

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